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Report to the Chairman, Committee on
Commerce, House of Representatives

April 2000

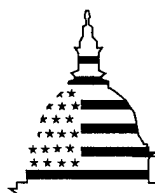
NUCLEAR WASTE

DOE's Advanced Mixed Waste Treatment Project— Uncertainties May Affect Performance, Schedule, and Price

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United States General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-284385

April 28, 2000

The Honorable Thomas J. Bliley, Jr.
Chairman, Committee on Commerce
House of Representatives

Dear Mr. Chairman:

For over 50 years, the Department of Energy (DOE) has produced nuclear materials for weapons. As a result of that effort, large quantities of radiological and hazardous wastes now contaminate the nation's nuclear production facilities. DOE spends over \$5 billion per year through its environmental management program to clean up and/or ensure proper storage of these wastes. DOE's Idaho National Engineering and Environmental Laboratory (INEEL), located in eastern Idaho, has a large concentration of "mixed" waste—that is, a combination of radiological contaminants (such as plutonium) and hazardous but nonradiological contaminants (such as degreasing agents or acids). This mixed waste, which takes such forms as contaminated paper, cloth, and other materials (some of it saturated with liquids), is currently stored in metal drums and wooden boxes in a facility intended for temporary storage. Cleaning it up is important to both DOE and the state of Idaho. DOE has committed to having this waste treated and moved out of Idaho and to a disposal facility no later than December 31, 2018.

To treat the mixed waste and prepare it for disposal, DOE awarded a fixed-price contract for the Advanced Mixed Waste Treatment Project to BNFL Inc. effective January 1997.¹ BNFL plans to construct a treatment facility at INEEL near where the waste is being stored. BNFL's initial plan was to use the treatment facility to characterize the waste containers to determine their contents and radioactivity; separate the waste into different treatment paths; treat the waste primarily by using incineration to reduce its volume and stabilizing the waste by either converting it into a glass-like material or adding a cement-like material; package the waste; and certify it for shipment for off-site disposal. Stabilizing the waste in glass or cement was

¹BNFL Inc. is the U.S. subsidiary of British Nuclear Fuels plc, a public limited company in the United Kingdom. The British government is the sole stockholder of British Nuclear Fuels plc.

planned primarily as a backup strategy in case DOE's off-site disposal location was not available, and therefore, temporary on-site storage was required after treatment. Treating the waste will not reduce its radioactivity but will prepare the waste for disposal or long-term storage. Because of the radioactive content of the waste, the treatment process was designed to require the workers to have little or no direct contact with the waste.

DOE considers the contract with BNFL to be a "privatization" contract. BNFL is responsible for financing the construction and start-up costs of the project instead of receiving cost reimbursements or progress payments to pay for these costs. BNFL will receive payments only after delivering items or services specified in the contract. Most of the contract payments will be for successfully treating and delivering to DOE packaged waste that meets all of the requirements for shipment off-site. The original contract with BNFL was for about \$876 million (1996 dollars). With adjustments for inflation over the 20-year life of the contract, DOE estimates that its expenditures on the project will total at least \$1.1 billion. Although the contract is a fixed-price contract, the Federal Acquisition Regulation allows for price adjustment if, for example, the scope of work changes drastically or BNFL encounters circumstances beyond its control. Given the potential cost of this project and concerns about DOE's management of previous large cleanup projects, you asked us to assess the project's status and potential uncertainties with regard to (1) successfully treating the waste, (2) meeting the project's deadlines, and (3) minimizing increases in the contract price.

Results in Brief

Changes in the technical approach have simplified the treatment of most of the waste, but successful treatment of almost one-fourth of the waste is less certain. For the bulk of the waste, these changes have brought less complexity to the treatment process. Instead of incinerating about 75 percent of the waste and then putting it into a glass-like or cement-like form, BNFL determined that most of the waste could simply be mechanically compressed and then packaged. For the remaining waste that was to be incinerated, however, recent events have forced BNFL to reexamine its approach. In March 2000, in order to resolve a lawsuit over incinerating the waste and allow facility construction to move forward, DOE agreed to appoint a special panel of experts to identify possible alternatives to incineration. Alternatives could include trying to obtain a waiver from current regulations for transporting and disposing of organic substances or identifying another technology to treat the waste. The outcome of these efforts may not be known for several years. If viable

alternatives are not found, DOE may need to return to its plan to incinerate a portion of the waste or attempt to renegotiate the disposition of the waste with the state of Idaho.

The project is beginning to fall behind the pace needed to meet certain interim milestones. BNFL's plan for starting construction, originally set for May 1999, is now set for May 2000 at the earliest and will be postponed even longer. This delay is also likely to delay the start of the facility's operations, one of the interim milestones in DOE's agreement with the state of Idaho, scheduled for March 2003. The main cause for the delay was BNFL's overly optimistic assumption, which DOE approved, of the time needed for the state and the Environmental Protection Agency to review and approve the construction permits for the project. Changes in the requirements for permit applications and the search for alternatives to incineration also affected the permits. As of April 2000, after 2 years of review, the permits still have not been issued. Because of the flexibility built into the project's schedule over the many years of the operational phase, however, it is too early to determine if any of these developments will affect BNFL's ability to complete all work by 2018, the deadline agreed to by DOE and the state of Idaho.

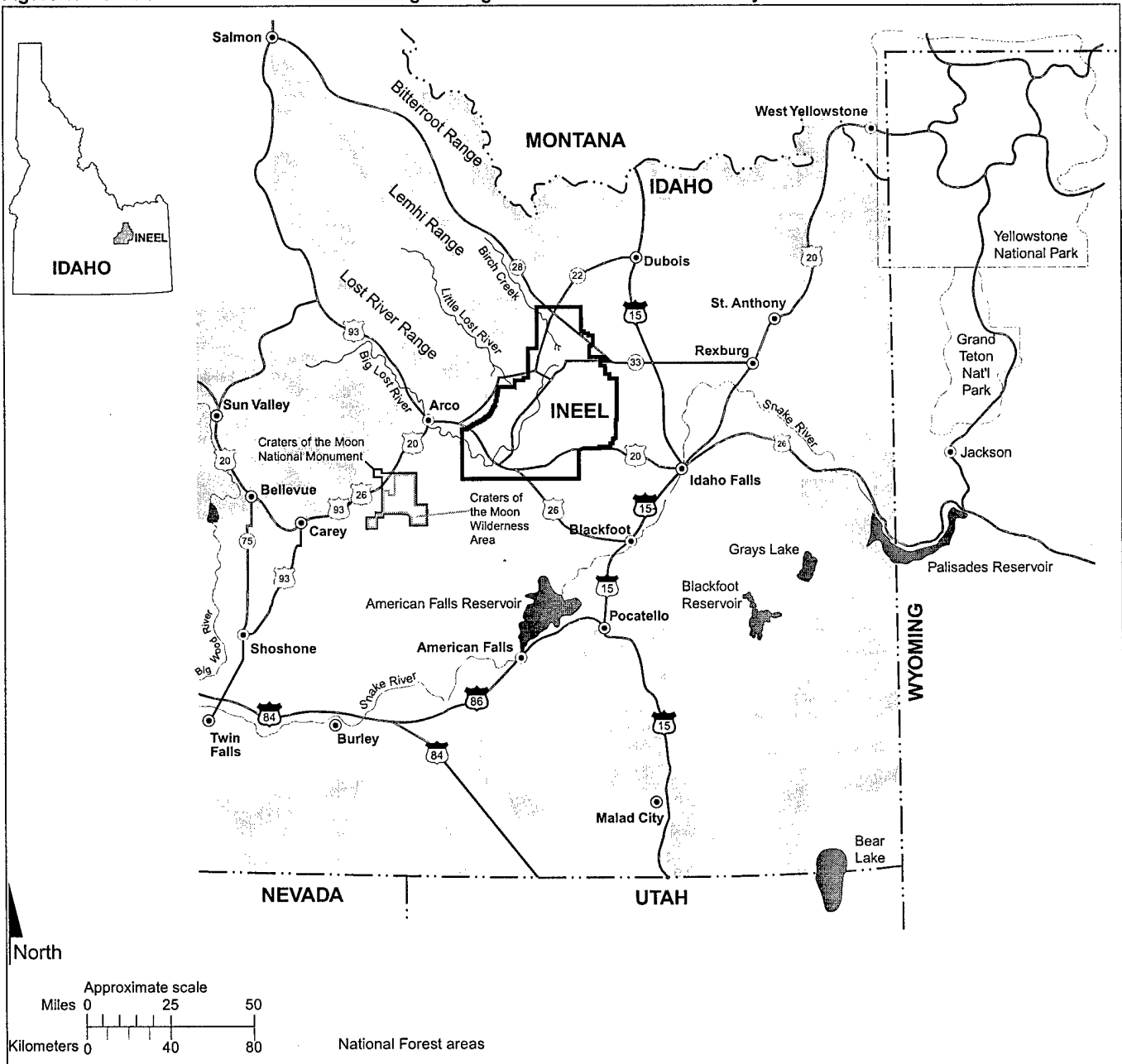
Despite some opportunities to reduce the \$876 million contract price, including an \$18 million reduction that occurred in January 2000, other uncertainties make it likely that the contract price will increase in the future. The \$18 million price reduction occurred after BNFL simplified the technology for treating most of the waste and, therefore, did not have to stabilize it before shipping it out of state. Other savings are possible if alternatives to privately financing the project are pursued, but DOE does not intend to assume more of the risk by assisting with financing. BNFL officials are reporting difficulty in the efforts to obtain private financing. An option available to DOE is to help finance the project and negotiate for a corresponding reduction in the contract price. Regarding potential price increases, two main uncertainties exist. First, BNFL may be able to obtain additional payments for the costs associated with the delays in starting construction of the treatment facility. DOE has estimated that delaying construction until May 2000 could increase the contract price by about \$44 million. But because the start of construction will be delayed beyond May 2000, the price increase could be even greater. Second, the costs associated with searching for an alternative to incinerating about one-fourth of the waste may also affect the contract price. DOE said that activities that BNFL could be involved in, such as exploring regulatory waivers and identifying alternative treatment technologies, could be

outside the current scope of work in the contract and thus could trigger the need for an equitable adjustment to the price.

Background

DOE's Idaho National Engineering and Environmental Laboratory is situated in southeast Idaho on about 900 square miles of the eastern Snake River plain (see fig. 1).

Figure 1: Location of DOE's Idaho National Engineering and Environmental Laboratory



Source: DOE's Idaho Operations Office.

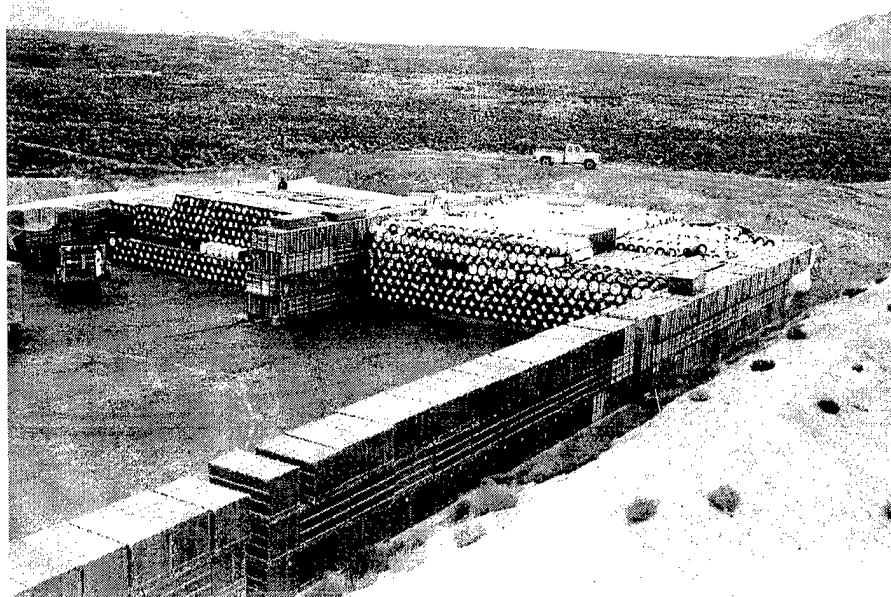
Since the early 1970s, DOE has been storing transuranic waste² at the INEEL site. Most of this waste was shipped from DOE's Rocky Flats site in Colorado. About 95 percent of the transuranic waste is classified as mixed waste because it also contains chemically hazardous materials that are regulated under the Resource Conservation and Recovery Act.³ Some of the waste also contains polychlorinated biphenyls (PCB), which are regulated under the Toxic Substances Control Act.⁴ The mixed waste is stored in metal drums and wooden boxes that are stacked on asphalt pads in an enclosed building in the Radioactive Waste Management Complex. The drums and boxes are covered with tarps, plywood, and soil. The quantity of waste totals about 65,000 cubic meters—an amount that would cover an entire football field to a height of almost 48 feet, or about as high as a four-story building. The drums and boxes have a 20-year design life and are not intended for permanent storage. Figure 2 shows the drums and boxes being placed on the pads prior to being covered and enclosed within a building.

²Transuranic waste contains man-made radioactive elements with atomic numbers higher than uranium, such as plutonium.

³Under the Resource Conservation and Recovery Act of 1976, as amended, a facility that treats, stores, or disposes of hazardous waste must obtain a permit from the Environmental Protection Agency or a state authorized by the Environmental Protection Agency to establish its own program. The permit sets out, among other things, the detailed conditions under which the facility may operate. In Idaho, the act is implemented by the state Department of Environmental Quality.

⁴The Toxic Substances Control Act, enacted in 1976, authorizes the Environmental Protection Agency to regulate all chemicals that present an unreasonable risk of injury to health or the environment. The act includes a provision that specifically required the Environmental Protection Agency to issue a rule governing PCB disposal. Under the rule, incineration is one of the principal disposal methods for PCBs, and approval from the Environmental Protection Agency is required before incineration can occur.

Figure 2: Mixed Waste Boxes and Drums Being Placed on an Asphalt Pad at INEEL



Source: BNFL's project files.

In October 1995, DOE and the state of Idaho agreed that DOE would ship the transuranic waste stored at INEEL to a location outside of Idaho no later than December 2018.⁵ The agreement also specified interim deadlines, including having a contract for a mixed waste treatment facility by June 1997, completing construction of the facility by December 2002, and beginning operation of the facility by March 2003. The agreement noted that the start of construction was contingent on the state's approving any necessary permits. Under the agreement, if DOE failed to meet these interim milestones, the state of Idaho could take action to stop additional shipments of spent nuclear fuel from entering the state until the milestones have been achieved.

⁵The October 16, 1995, agreement between the state of Idaho, the Department of the Navy, and DOE settled the case of *Public Service Co. of Colorado v. Batt*. In the Batt case, the 9th Circuit Court of Appeals strictly limited shipments of spent nuclear fuel to INEEL, finding that DOE's environmental analysis was inadequate to support additional spent fuel shipments to the site. The consent agreement allowed more spent fuel to be sent to INEEL, provided that all transuranic waste at INEEL would be treated and removed from the state before December 2015, or December 2018 at the latest. Consistent with the agreement, both DOE and the Navy continue to ship spent nuclear fuel to INEEL.

In January 1996, DOE issued a request for proposals for the treatment of 65,000 cubic meters of transuranic and other mixed wastes. DOE specified performance requirements for the treatment process, including treating waste to meet current regulatory standards and reducing the volume of waste, and left the choice of technology to the bidders. After reviewing proposals from four companies, DOE awarded a fixed-price contract to BNFL, effective January 1997, to provide waste treatment services. The contract included milestones agreed to with the state of Idaho for completing construction, beginning waste treatment operations, and completing waste treatment operations. The total contract price was \$876,093,000 and included three project phases:

- Phase I—designing, licensing, and permitting activities, and ensuring environmental compliance: This phase was to last from January 1997 through January 2000. The firm fixed-price amount of \$16.3 million available for this phase was to be paid for deliverables, such as the project management plan and various construction permits issued by state and federal regulators.
- Phase II—constructing the facility, installing equipment, and testing all systems to ensure the facility is ready to begin operations: Phase II was to start in January 2000 and to be completed by March 2003. DOE intends to make no payments to BNFL during phase II for expenses incurred during this phase. Instead, DOE will reimburse BNFL for the \$569.4 million associated with this phase as the waste is treated in phase III.
- Phase III—treating 65,000 cubic meters of mixed waste: Phase III was expected to last from March 2003 through December 2015, but to end no later than December 2018. The contract provided for payment of \$4,468 per cubic meter of treated waste, or a total of \$290.4 million. In addition, for the first 25,000 cubic meters of treated waste, BNFL was also to receive \$22,776 per cubic meter to recover the costs of phase II.

Because of the length of the contract—from its effective date in January 1997 until at least 2015—two contract provisions were added to recognize changing costs over time. First, the contract contains a provision for an annual price adjustment that is to be applied only to the first 25,000 cubic meters of waste processed. The contract's unit price of \$4,468 will be adjusted annually based on an employment cost index from the Bureau of Labor Statistics.⁶ This price adjustment was first applied in calendar year 1997. According to DOE's estimate, adjustments for inflation over the life of the contract, including this annual price adjustment, will increase the total expenditures on the contract to about \$1.1 billion by 2018. The second type of price adjustment will come into effect after BNFL treats the first 25,000 cubic meters of waste. While treating the remaining 40,000 cubic meters of waste, BNFL can request a new unit price every 5 years by submitting its current costs and proposed new unit prices to DOE. This second price adjustment is not automatic, but will be negotiated between DOE and BNFL. Because this would be a negotiated price adjustment based on future operating costs, DOE has not estimated the impact of this provision on the contract price.⁷

The contract also required that BNFL reduce the volume of waste by at least 65 percent to save on transportation costs and future storage costs. Finally, the contract had a list of assumptions that were considered material to contract performance—for example, that any project-related litigation will not affect the schedule or work activities and that the proposed construction site will not be contaminated with radioactive or hazardous materials. Any changes to these assumptions that are outside of BNFL's control can form the basis for a request to DOE for an adjustment of the contract price.

⁶The annual price adjustment applies only to the \$4,468 unit price for treated waste and does not apply to the \$22,776 per cubic meter that recovers the costs of phase II. The employment cost index measures changes in compensation costs, which include wages, salaries, and the cost of employee benefits. The contract is adjusted based on changes to the "Employment Cost Index, Wages and Salaries, All Private Industry Workers (Labor)."

⁷The contract also calls for BNFL to conduct "decontamination and decommissioning" activities after the waste is processed. At the time the contract was awarded, the price of this activity was not determined because it was not expected to occur until about 2018. However, in its fiscal year 2000 budget request, DOE estimated the cost at \$22.7 million. In addition, DOE estimated the cost of infrastructure and other support for the project at \$72.2 million.

A Changed Approach Simplifies the Treatment of Most Waste but Makes the Successful Treatment of Some Waste Less Certain

Between the effective date of the contract in January 1997 and March 2000, major changes have been made to the project's technical approach. For the bulk of the waste, these changes have brought less complexity to the treatment process. In March 2000, however, to resolve a pending lawsuit over the treatment process for about one-fourth of the waste and allow facility construction to move forward, DOE agreed to examine alternative approaches—all relatively unproven—for this portion of the waste. The outcome of this action may not be known for several years. If viable alternatives are not found, DOE may need to return to its plan to incinerate a portion of the waste or attempt to renegotiate disposition of the waste with the state of Idaho.

Since the contract took effect in January 1997, significant changes have been made to the technical approach for treating the waste. Table 1 shows the treatment process originally proposed in September 1996 and the process as currently designed.

Table 1: Original Proposed Treatment Process and Currently Planned Process

Original proposal (September 1996)	Currently planned process (March 2000)
Retrieve the waste from storage; characterize and sort the waste	Same
Incinerate about 75 percent of the waste to meet treatment requirements and achieve volume reduction	For about 22 percent of the waste, postpone treatment and study alternatives to meeting treatment requirements by means other than incineration (through new technology or a waiver from existing regulations)
	Compress the other 78 percent of the waste to meet volume reduction requirements in the contract
Process the incinerated material into glass logs in containers to stabilize it for permanent disposal	No course of action in place for the waste still under study
For the 25 percent of the waste not incinerated, add a cement-like substance (grout) to the containers to stabilize the waste for permanent disposal	Place compressed waste into containers for permanent disposal off-site
Certify the waste containers for shipment to off-site disposal	Same

Source: BNFL's project documentation.

Several factors have led to the changes in the design of the treatment process:

- First, based on its review of the inventory records of the stored waste and further clarification from DOE personnel at Rocky Flats, BNFL determined that much of the waste could be classified as "debris" under the regulations of the Environmental Protection Agency. The regulations define debris as certain solid particles larger than 60 millimeters in size and provide that the debris does not have to be incinerated before disposal. Determining that much of the waste on this project met the definition of debris enabled BNFL to reduce the amount of waste to be incinerated from about 75 percent to about 22 percent. BNFL retained incineration as the proposed approach for about 22 percent of the materials because incineration (1) will treat waste to meet the requirements at DOE's disposal site in New Mexico and (2) is specified in the regulations for destroying the PCBs found within the specific waste forms at INEEL.
- Second, melting or grouting the waste became unnecessary because a disposal site became available that did not require this step as a condition for receiving the waste. When the contract was initially awarded, BNFL and DOE thought that converting the waste to a glass or cement form would be necessary mainly because the availability of such a site was uncertain. If the treated waste could not be sent off-site for disposal, it would have to meet other land disposal requirements, which included using the glass or cement material. However, DOE's disposal site for transuranic waste opened in New Mexico in March 1999. Because the New Mexico facility has other disposal safeguards, material sent there does not have to undergo this treatment.⁸

For the most part, these changes in the proposed approach have resulted in a less technically complex treatment process that primarily involves compressing the waste to reduce its volume. BNFL has experience with compressing plutonium-contaminated waste at other nuclear facilities, including its Sellafield site in the United Kingdom. The simplified approach also increases the likelihood that the treatment facility can operate successfully for the 12 to 16 years necessary to treat the waste.

⁸A small amount of waste may still have to be mixed with cement to meet criteria for transport or to meet land disposal requirements.

For about one-fourth of the waste, however, recent events will likely complicate the treatment approach. In March 2000, DOE settled a lawsuit brought by outside groups over BNFL's plans to incinerate part of the waste.⁹ Currently, incineration is the only proven technology and approved method for destroying PCBs in mixed waste. PCBs and other organic substances in the mixed waste must be destroyed to satisfy the requirements for transporting the waste and to meet the waste acceptance criteria at DOE's disposal site in New Mexico.

Under the agreement to settle the lawsuit, the incineration component of the treatment process was put on hold. This will allow a major portion of the project to move forward but also means that for about 22 percent of the waste, including waste contaminated with PCBs, no treatment plan is in place. DOE agreed to pursue alternatives to incineration by exploring both alternative technologies and potential waivers of regulatory requirements. To identify alternative treatment processes, DOE agreed to appoint a panel of independent scientific experts.¹⁰ The panel's report to the Secretary of Energy is due in December 2000. DOE is also evaluating regulatory options that, if accepted, could reduce the amount of waste that needs to be incinerated to about 3 percent. These options include less restrictive requirements for packaging and transporting the waste and disposing of the PCBs without treatment.

Treatment alternatives to incineration may be difficult to develop, and DOE is unsure whether this effort will be successful. According to the DOE Environmental Management program waste management scientist responsible for oversight of the Idaho project, there is a chemical treatment process that can destroy PCBs. However, this alternative technology has not been used or demonstrated on transuranic mixed waste. Before this alternative process could be used to treat transuranic mixed waste, additional research and development would be required. He said that DOE would need to demonstrate through a pilot project that the chemical

⁹In September 1999, two plaintiff groups—Keep Yellowstone Nuclear Free and the Environmental Defense Institute—filed suit in U.S. District Court in Wyoming requesting an injunction against the construction of the incinerator. The complaint alleged that DOE's environmental impact statement on the project was deficient. The plaintiffs alleged that DOE failed to study the likely impacts of the airborne pollutants from the project's incinerator on areas in Wyoming that the plaintiffs believe would be affected.

¹⁰Under the settlement agreement, DOE also agreed to pay \$150,000 to the plaintiffs to cover attorney and expert witness fees and other costs associated with the lawsuit.

treatment process could be used on transuranic waste and then obtain approval from the Environmental Protection Agency to use the process.

As for the option of obtaining waivers to allow packaging, transporting, and disposing of the waste containing PCBs and other organic substances without treatment, DOE's decision on packaging options is expected in May 2000. The timing of decisions on transporting and disposing of the waste without further treatment is unknown. DOE also said that disposal without treatment would require the modification of the mixed waste disposal permit issued by the state of New Mexico.

If DOE is not successful in either developing new technology or obtaining the regulatory waivers, DOE may need to proceed with plans to incinerate the waste. Under those circumstances, the plaintiffs in the lawsuit have reserved the right to reinstate the lawsuit challenging use of the incinerator. At that point, if incineration is not an option for DOE, it may need to attempt to renegotiate disposition of the waste with the state of Idaho.

Interim Project Milestones Are Likely to Slip, but the Effect on the Final Completion Date Is Unclear

Although the project is still in its early stages and construction has not started, completion of the earliest steps is already about 3 months behind the milestones in the contract and about 1 year behind the schedule included in BNFL's original project management plan. Additional delays are likely to occur while the permit applications are modified to eliminate incineration from the treatment process. BNFL underestimated the time required to obtain construction permits from state and federal regulators, and subsequent milestones for starting construction and for starting treatment operations are also in jeopardy. The flexibility built into the operational phase of the project should absorb some of these delays, but it is too early in the project to determine if BNFL can treat and remove all waste by the agreed-upon milestone of December 31, 2018.

The Project Is Behind Schedule on Early Interim Milestones

Although it is still early in the project, BNFL has fallen at least 1 year behind interim milestone dates in its original project management plan for the construction and start-up of the treatment facility. According to BNFL's current estimate, construction will not be complete until August 2002, and treatment operations will not start until November 2003. As a result, DOE will most likely miss the March 2003 interim milestone for the start of operations specified in the agreement with the state of Idaho (see table 2).

Table 2: Comparison of Selected Schedule Milestones for the Project

	Milestones in contract with BNFL (Jan. 1997)	Initial approved project schedule (Apr. 1997)	Revised approved project schedule (May 1999)	BNFL's working estimate of project schedule ^a (Feb. 2000)
Submit permit applications	None	Jan. - Apr. 1998	Completed on time	Completed
Permits issued	Jan. 2000	Jan. - Mar. 1999	Aug. 1999	Apr. 2000
Start construction	None	May 1999	Sept. 1999	May 2000
Complete construction	Dec. 2002	Dec. 2001	Dec. 2001	Aug. 2002
Start operations	Mar. 2003	Mar. 2003	Mar. 2003	Nov. 2003
Complete project	Dec. 2018	Dec. 2018	Dec. 2018	Dec. 2018

^aThese dates have not been reviewed or approved by DOE.

Source: BNFL's project documentation.

DOE's contract with BNFL specified that all construction permits would be issued by January 2000 and that construction would be completed by December 2002. However, to have more contingency time in the schedule, BNFL modified those dates in its original project management plan. BNFL's accelerated schedule anticipated receiving the permits and starting construction a year earlier than DOE specified in the contract. This would also have allowed BNFL a full 15 months after construction was completed for operational testing and review.

BNFL Underestimated the Time Needed to Obtain Construction Permits

BNFL is behind its construction schedule because it underestimated, with DOE's approval, the amount of time needed to obtain the permits necessary to begin construction. BNFL needed to obtain three key permits from state and federal regulators:¹¹

- Clean Air Act permit. This permit addresses air pollution control and testing and limits the amount of air pollution allowed during the construction and operation of the facility. The state of Idaho issues this permit consistent with state law and the federal Clean Air Act.
- Hazardous Waste Management Act permit. This permit addresses the treatment requirements for materials such as mercury and organic compounds such as industrial cleaning solvents. Without this permit, the

¹¹In addition to these three key permits, the state of Idaho also required a Hazardous Waste Facility Siting license, which was issued in September 1997.

facility cannot be constructed or operated. The state of Idaho also issues this permit consistent with state law and the federal Resource Conservation and Recovery Act.

- Toxic Substances Control Act permit. This permit addresses the treatment requirements for toxic substances such as PCBs. The Environmental Protection Agency issues this permit.

BNFL's original project management plan called for obtaining all permits necessary to begin construction by March 1999. As a result, BNFL's project schedule allowed only about 1 year after submitting the permits for the regulators to complete review, public comment, and issuance. BNFL wanted the permits to be issued by March 1999 to provide additional time for construction and testing activities and, therefore, to increase the likelihood of its meeting the project's other interim milestone dates. Both BNFL and DOE acknowledged that planning to obtain the permits by March 1999 represented a very aggressive schedule but stated that they believed that it was essential to meet the interim milestones that DOE and the state of Idaho had agreed to in 1995 for completing construction and beginning waste treatment operations.

The application for the Clean Air Act permit was completed on schedule and submitted to the state of Idaho for review. Idaho's review of this permit, including the public comment period, was completed in October 1999, but it is unclear when the state will issue the permit. The state chose to wait until the public comment phase on the other two permits was completed before taking further action. According to state officials, this decision was made to ensure consistency among all three permits.¹²

Review of the applications for the Idaho Hazardous Waste Management Act¹³ and Toxic Substances Control Act permits is still under way. These two permits are being processed simultaneously since the technical issues are much the same. The public comment period for the two permits closed February 7, 2000, but regulators believed it would take at least until April 2000 for the state and the Environmental Protection Agency to resolve the

¹²In October 1999, DOE paid BNFL \$2.2 million for the Clean Air Act permit even though the state had not issued the permit. DOE did so because it decided that the reasons for BNFL's not receiving the permit as scheduled in March 1999 were outside of BNFL's control. Therefore, the contract allowed for the payment, even though the permit was not issued, because BNFL had satisfactorily completed all of its work on the permit application.

¹³This state law implements the federal Resource Conservation and Recovery Act in Idaho.

comments received. Moreover, under Idaho law, once permits are issued, the contractor will have to wait 30 days before starting construction to allow any concerned citizens to file appeals questioning the decision. Such appeals would be handled by the state of Idaho or the Environmental Protection Agency rather than by DOE, but their resolution could delay the project further.

State of Idaho officials said that BNFL's original schedule for obtaining the permits by March 1999 was unrealistic. They said, for example, that although it can take between 3 and 5 years for the state to review and approve a hazardous waste permit, the state agreed to try to complete its review in about 2 years. In contrast, BNFL allowed only about 1 year in its schedule for the regulatory review process. Idaho officials said that before the project began, they were very candid with DOE and BNFL about the time required to obtain the permits. However, they also acknowledged that the permit application paperwork that BNFL submitted was of high quality and this helped speed up the review process. The review of the permits was also affected by new draft guidelines the Environmental Protection Agency issued in July 1998 on assessing the risks to human health and the environment from a project. These new requirements for identifying risks associated with the wastes and chemicals to be treated caused BNFL to rework a portion of its permit application.

BNFL's current working estimate of the project's schedule anticipated that the permits would be issued by April 2000. This is 13 months later than planned in BNFL's original schedule and 3 months later than specified in the contract. However, the search for an alternative to incineration will also affect the issuance of the permits. As part of the settlement agreement, DOE and BNFL asked the state of Idaho and the Environmental Protection Agency to postpone regulatory approval of the incinerator portion of the permit applications.¹⁴ The impact of this change on the issuance of the three permits needed to start construction is currently unknown. If the applications for the permits need to be revised and resubmitted, this process could add considerably to the schedule for obtaining them. However, if the regulators are able to simply remove the incinerator component from the permit applications, it could take less time. According to state of Idaho officials, even if the more expedient approach can be used, it is unlikely that the permits can be approved and issued before July 2000.

¹⁴If the regulators issue permits for the entire treatment facility, including the incinerator, the settlement agreement will no longer be valid, and the plaintiffs may refile the claim.

The Delay in the Start of Construction Affects the Ability to Meet Other Interim Milestones

Although the project has fallen behind the initial schedule for obtaining permits and starting construction, the dates specified in the contract for completing construction and starting operations have not changed. Therefore, the time available to complete some project activities has been reduced. For example, BNFL had originally planned on completing construction by December 2001, or 12 months earlier than the contract's milestone date. This would have allowed 15 months to complete all operational testing and readiness reviews in time to meet the March 2003 milestone for the start of operations. Both DOE and BNFL officials said that allowing 15 months for the operational testing and readiness reviews is prudent.

To maintain the 15 months for operational testing, given the delays that have occurred so far, BNFL has had to reduce the time available for constructing the treatment facility. The initial project schedule allowed 31 months for constructing the treatment facility. Assuming no further delay beyond May 2000 for starting construction, the time available for constructing the facility has been reduced by 5 months to 26 months. According to the BNFL project manager, reducing the time available for construction will require BNFL to overlap construction activities, to reduce the contingency time available for addressing problems, and to incur higher construction costs if adding a third shift is necessary. He said that although the compressed construction schedule is necessary to preserve the 15 months needed for operational testing, the shorter construction period increases the risk of not being able to complete construction or start operations on schedule.

Incorporating the provisions of the agreement to eliminate the incinerator from the permit applications may make it even more difficult to begin construction in 2000. Because the construction site is in an area of the state that experiences severe winter weather, BNFL's initial construction schedule provided for beginning the work early enough in the year—no later than March or April—to have the building shell enclosed by the beginning of severe winter weather in October or November. In that way, the interior construction work could proceed throughout the winter. If construction is delayed beyond the spring of 2000, BNFL could lose another construction season and further delay the start of operations.

The Effect of Schedule Changes on the Project's Completion Date Is Unknown

At this point in the project, it is too early to determine if slippage on interim schedule milestones will affect the December 2018 milestone for completing the entire project. BNFL will try to make up time after construction starts by overlapping activities and adding extra personnel. Also, because of the flexibility built into the operational phase of the project, BNFL said that it could slip completion of construction somewhat and still complete treating and disposing of the waste on or before December 2018. The flexibility in the operational phase of the project exists because the contract allows almost 16 years to complete the processing of the waste. Working at capacity, the treatment facility is designed to process about 7,000 cubic meters of waste each year, meaning that it could process the entire 65,000 cubic meters in less than 10 years.

However, it is difficult to predict what impact the March 2000 settlement of the environmental lawsuit will have on the goal of completing the project by December 2018. If an alternative technology is identified, it may take considerable time to fully test, develop, and obtain approval to use it. DOE's alternative strategy of attempting to obtain regulatory waivers may also involve a lengthy process. It is unclear if the flexibility in the operational phase of the project will be sufficient to absorb these delays.

The Final Contract Price Is Uncertain but Will Likely Be Higher

Although the initial fixed-price contract with BNFL was for \$876 million, the contract contains provisions for either decreasing or increasing the price to account for such things as changes in contract requirements or unforeseen circumstances beyond the contractor's control.¹⁵ A price reduction of \$18 million has already occurred because of the steps taken to simplify treatment of most of the waste. Other savings are unlikely to occur but are possible if alternatives to private financing are pursued. However, uncertainties in two other areas could affect BNFL's ability to carry out the project as planned and could result in increases to the contract price. These uncertainties involve the delays in starting construction and the search for alternatives to incinerating a portion of the waste.

¹⁵Under the Federal Acquisition Regulation, fixed-price contracts normally allow for equitable adjustments to the contract price for changes that occur outside the control of the contractor.

Simplified Technology Resulted in a Price Reduction

Changes in the technical approach can affect a contractor's scope of work and, therefore, the contract price. When BNFL shifted to a simpler technology for treating the waste by eliminating from the treatment process the step to stabilize the waste in cement, the contract price was reduced. In January 2000, DOE approved a contract modification that reduced the contract price by \$18 million. The price reduction occurred because the simpler technology will result in lower labor and material costs.

Alternative Financing, if Pursued, Could Reduce the Contract Price

It is possible that decisions on the project's financing, if they depart from the initial approach, could also reduce the contract price. In its offer submitted in September 1996, BNFL proposed financing phase II of the project—construction and testing—with internal funds obtained from its parent company. Phase III of the project—operations—was to be financed with commercial debt and with revenues received from DOE for successfully processing the waste. However, BNFL also planned to review its financing options during the first 3 years of the contract to identify the most efficient financial arrangements, including obtaining commercial financing for phase II construction activities. Financing costs are significant—of the estimated \$570 million of construction and testing costs in phase II of the contract, almost \$300 million represents BNFL's financing costs if it funds this phase from internal sources.¹⁶

At this point, BNFL is unsure if it will try to obtain commercial financing for the project or continue to finance the project internally. BNFL's Senior Vice President said that BNFL has concluded, after discussions with the financial community, that commercial banks would not lend money for construction until all of the necessary permits had been issued, and that the banks would also require other changes to the contract before making funds available. BNFL concluded that lenders would require contract

¹⁶Private financing is a fundamental feature of DOE's privatization strategy for cleanup projects. The strategy was established in 1994 in an effort to reduce costs and improve the timeliness of cleanup projects. DOE expects that private financing will provide contractors with a greater incentive to perform because recovering their investment depends on performance and because outside lenders will provide third-party oversight to ensure that their investment is sound. For a discussion of how different financing and contracting strategies on DOE's projects, such as the Advanced Mixed Waste Treatment Project, can affect the risks and costs to the government, see *Department of Energy: Alternative Financing and Contracting Strategies for Cleanup Projects* (GAO/RCED-98-169, May 29, 1998).

changes that would, among other things, (1) limit the decision-making authority of the DOE contracting officer to decide what payments BNFL would be entitled to if disagreements arise and instead establish predetermined performance criteria and some form of third-party dispute resolution, and (2) ensure that under a termination of the contract for convenience, the government's payment to BNFL would include not only the outstanding principal, but also include interest and fees.

DOE's Director of Contract Reform and Privatization said that DOE expects BNFL to finance the project from its internal sources of funds if it cannot obtain commercial financing. However, in the unlikely event that financing is not available from commercial lenders and/or BNFL's parent company, and BNFL is unable to carry out the contract, DOE would have to take some action, such as terminating the contract or modifying the contract to facilitate financing of the project.¹⁷

It is unclear what approach DOE would take if BNFL could not complete the project as planned. DOE's Director of Contract Reform and Privatization said that he cannot envision a scenario in which BNFL would be unable to obtain financing for the project. However, he also said that if BNFL could not finance the project, DOE would have the option of making progress payments during construction and testing or agreeing to other contract modifications to make financing the project more attractive to commercial lenders. These potential changes to the contract would also likely change the way that risk is allocated between the two parties since DOE's cost exposure would be greater. Because BNFL's offer was based on the allocation of risk between BNFL and DOE in the original proposal, any major changes to the contract that result in a reallocation of risk away from BNFL may also indicate the need for a corresponding reduction to the contract price.

Delays in Starting Construction Are Likely to Increase the Contract Price

Delays in starting construction of the treatment facility will likely result in contract price increases. DOE officials in Idaho have examined the possible effects on the project's schedule because of the delays from the January 2000 date in obtaining permits. DOE concluded that if the start of construction is delayed until May 2000, as projected in BNFL's working

¹⁷The contract provides that it will not be considered a termination for default if project financing is not available from the private sector and/or the corporate parent for reasons outside of the control of BNFL.

estimate, the potential price increase to the government would be about \$44 million. Major components of the price increase include the costs associated with paying contractor personnel during the delay and the financing costs. If the start of construction is delayed beyond May 2000, the price increase would be even greater.

DOE could have avoided at least some of the price increase associated with the construction delays by requiring BNFL to bid the project using a more realistic estimate of the time required to obtain the permits. BNFL would have factored the longer period for obtaining permits into the pricing of the contract. Although DOE may then have paid a higher initial price for the contract, both DOE and BNFL officials agree that the price increase likely would have been less than what BNFL may now request once the permits are finally issued and construction can begin.

DOE's vulnerability to this potential contract price increase raises the question of why DOE agreed to the 2-year time frame for obtaining the permits. According to DOE's project manager at the Idaho site, DOE agreed to the milestone date, even though it was considered a challenging date to meet, because the only other alternative was to try to negotiate with the state of Idaho to change the interim project milestone dates DOE and the state agreed to in 1995. He said that DOE did not think that the state would be willing to renegotiate the agreement even if the project's completion date remained the same. DOE's Director of Contract Reform and Privatization said that this situation was a good example of the trade-off DOE must make between making a good business decision to keep the contract price down and meeting its commitments to individual states, potentially at a higher price. He said that in this case, the commitment to the state took precedence over a good business decision.

The Search for an Alternative to Incineration May Affect Price

The recent decision to suspend the use of incineration for about 22 percent of the waste and to pursue other alternatives for meeting disposal requirements could also affect the contract price. According to the DOE contracting officer, activities that BNFL could be involved in, such as exploring regulatory waivers and identifying alternative treatment technologies, could be outside the current scope of work in the contract and thus could trigger the need for an equitable adjustment in the contract price. But DOE also believes the possibility exists that with changes in technology or waivers of regulatory requirements for disposal, the contract price could decrease. So far, it is unclear what the full scope of the changes to the project will be or how much they will cost.

Agency and Company Comments

We provided a draft of this report to DOE and BNFL for their review and comment. DOE said that the draft report was comprehensive and fairly characterized several of the uncertainties on the project. However, DOE believed that the draft report contained some factual inaccuracies and was incomplete or misleading in three respects. First, DOE said that the advantage of settling the lawsuit concerning the incinerator was not fully described in the draft report. When DOE settled the suit, the plaintiffs agreed not to file appeals to the construction permits. As a result, DOE expects that BNFL will be able to proceed with the construction of the facility without additional delay. We modified our report to make it clear that the settlement agreement could allow construction to move forward.

Second, DOE said that the draft report overstated the potential difficulties of pursuing alternatives to incineration. DOE believes that there will be opportunities to accelerate and resequence construction and readiness review activities and that a treatment facility without incineration will be somewhat smaller, allowing construction to be completed by December 2002. DOE also said that waste not requiring treatment could be retrieved, characterized, and shipped starting in March 2003 or earlier. We believe that our report fairly describes the difficulties associated with making the project fully operational by March 2003. DOE may be able to find shortcuts for completing some of the work, and our report recognizes this possibility. But the construction permits have not been issued, and uncertainties remain about how to treat up to about 22 percent of the waste. It is possible that DOE may have to include the incinerator in the project to successfully treat all of the waste. Given these delays and uncertainties, having a fully operational facility by the contract date of March 2003 is doubtful. In fact, in its comments on the draft report, DOE acknowledged that completing construction and operational testing in time to have the facility fully operational by March 2003 is questionable.

Finally, DOE said that the draft report does not adequately acknowledge that any project of this scale and complexity has uncertainty that can affect cost, schedule, and performance. We disagree and believe that our report fairly presents these uncertainties and their potential effects on the project.

DOE also provided several technical corrections that we incorporated as appropriate. DOE's comments and our responses to specific comments are presented in appendix I.

BNFL's Senior Vice President advised us that the draft report was a fair and reasonable representation of the status of the project. He also provided clarifications on BNFL's financing strategy for the project, which we incorporated as appropriate.

Scope and Methodology

To determine how the current project compares with the initial plans in terms of approach and schedule, we reviewed the proposal submitted by BNFL in September 1996 and subsequent documents that reflected the changes to the technical approach. We also reviewed the contract between DOE and BNFL, BNFL's project management plans that included the original and approved baseline schedules, and DOE's environmental impact statement and record of decision on the Advanced Mixed Waste Treatment Project. In addition, we interviewed officials with DOE's Idaho Operations Office, BNFL in Idaho Falls, and Idaho's Department of Environmental Quality. We also toured the Radioactive Waste Management Complex at the Idaho Falls site where the facility will be constructed.

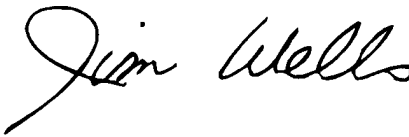
To determine what uncertainties might affect the ability to successfully complete the project on time and within budget, in addition to our work on the changes in the technical approach and the project's schedule, we reviewed contract requirements, DOE and BNFL's reports and records on the permit applications, and available records pertaining to the legal challenge to DOE's environmental assessment process for the incinerator. We also interviewed the DOE contracting officer and Advanced Mixed Waste Treatment Project manager at DOE's Idaho Falls Operations Office and officials with DOE's Offices of General Counsel, Contract Reform and Privatization, and Environmental Management. In addition, we interviewed officials with BNFL's Idaho Falls project office and the Vice President responsible for the project. We also interviewed officials with the Idaho Department of Environmental Quality and the Environmental Protection Agency to determine the status of the permits for the project.

We performed our review from September 1999 through April 2000 in accordance with generally accepted government auditing standards.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this report. At that time, we will send copies to the Honorable Bill Richardson, the Secretary of Energy. We will also make copies available to others on request. Please call me or Derek Stewart at

(202) 512-3841 if you or your staff have any further questions. Major contributors to this report were Margaret L. Armen, Carole J. Blackwell, Thomas C. Perry, Stan G. Stenersen, William R. Swick, and Charles A. Sylvis.

Sincerely yours,

A handwritten signature in black ink that reads "Jim Wells". The signature is written in a cursive, flowing style.

Jim Wells
Director, Energy, Resources,
and Science Issues

Comments From the Department of Energy

Note: GAO's comments supplementing those in the report text appear at the end of this appendix.



Department of Energy
Washington, DC 20585

April 21, 2000

Mr. Derek Stewart
Associate Director
Energy, Resources, and Sciences Issues
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Stewart:

Thank you for the opportunity to comment on your report entitled "Nuclear Waste: DOE's Advanced Mixed Waste Treatment Project - Uncertainties May Affect Performance, Schedule, and Price" (GA/RCED-00-106), April 2000. Although we found the draft report to be comprehensive, we have identified some factual inaccuracies and broader concerns, which are provided in the enclosed comments.

The Advanced Mixed Waste Treatment Project (AMWTP) is a key component of the Department's cleanup mission at the Idaho National Engineering and Environmental Laboratory (INEEL). The AMWTP is necessary to meet the requirements of the 1995 Settlement Agreement with the State of Idaho to process the stored transuranic waste for shipment out of Idaho no later than 2018.

The Department recognizes the technical, financial, and management uncertainties inherent in this project, and believes that these can be successfully managed. While your draft report fairly characterizes several of these uncertainties, in some cases the draft report is incomplete or misleading. The advantages of having settled the recent lawsuit about the AMWTP was not fully described. The draft report overstates the potential difficulties of pursuing alternatives to incineration. Also, the draft report does not adequately acknowledge that any project of this scale and complexity has uncertainty that can affect cost, schedule, and performance. An essential challenge for managing any project is to make progress while being aware of the significance of the uncertainties.

Joe Boda of my office is available to discuss our comments. He can be reached at 301-903-7123.

Sincerely,

A handwritten signature in cursive script, reading "Carolyn L. Huntoon".

Carolyn L. Huntoon
Assistant Secretary for
Environmental Management

Enclosure

Appendix I
Comments From the Department of Energy

Enclosure

Comments on Draft GAO Report GAO/RCED-00-106 – Nuclear Waste: DOE's Advanced Mixed Waste Treatment Project – Uncertainties May Affect Performance, Schedule, and Price, April 2000

See comment 1.

1. General Comment – The report conclusion that the project interim milestones are likely to be missed, namely the completion of construction by December 31, 2002, and start of operations by March 31, 2003, are somewhat misleading to the uninformed reader. While the delay in start of construction has put those milestones in jeopardy, much effort will go into identifying and implementing mitigating measures to recover schedule losses. Both the construction schedule and the period for testing and operational readiness reviews offer opportunities for accelerating and resequencing of the work. As a result of the Secretary's decision to postpone incineration, the initial AMWTP structure will be somewhat smaller and construction completion of the facility (without incineration) is still expected prior to December 31, 2002. Whether the construction of the facility can be completed in time to undergo testing and operational readiness reviews such that the facility is fully operational by the March 31, 2003, date is questionable. However, the retrieval, characterization, and loading operations should be fully functional such that wastes that qualify for shipment to the Waste Isolation Pilot Plant (WIPP) without further treatment could be shipped starting March 31, 2003, or earlier.

See comment 2.

2. General Comment – Because of the overall schedule contingency, or "flexibility" as stated in the report, an implication that there are any effects on the final completion date is unfounded.

See comment 3.

3. General Comment - BNFL's original proposal (September 1996) did not include incineration as indicated in the report (i.e., Table 1). BNFL's original proposal included the thermal treatment processes of thermal desorption and vitrification.

See comment 4.

4. General Comment - Waste treatment by incineration was being planned due to polychlorinated biphenyl (PCB) disposal restrictions, transportation limits on hydrogen gas generation within transport containers, and flammable constituents within the waste. With incineration being postponed, alternatives for addressing each of these problems must be found, not just an alternative treatment for PCBs. Also, see our comment # 9.

Now on p. 4.
See comment 5.

5. Page 2, second paragraph, sixth sentence - Cite the specific provisions for price adjustment for, "the scope of work changes drastically or BNFL encounters circumstances beyond its control." FAR 52.243-1 Changes - Fixed Price allows for an equitable adjustment in the contract price, delivery schedule, or both for changes within the general scope of the

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contract in the description of services to be performed, time of performance, or place of performance.

Now on p. 4.
See comment 1.

6. Page 2, last paragraph, fifth sentence and page 8, first full paragraph, third sentence – The rationale for settlement on the lawsuit was not to resolve the lawsuit. The plaintiffs' case was thought to be very weak. The settlement included an agreement that the plaintiffs would not file appeals to the environmental permits. These potential permit appeals could have caused significant delays. Thus, by agreeing to postpone a decision on incineration, the regulators should be able to issue the permits without incineration and BNFL will be able to proceed with construction of the facility.

Now on p. 4.
See comment 4.

7. Page 2, last paragraph, sixth sentence - DOE suggests changing the sentence to: "Alternatives include obtaining a waiver from current PCB disposal restrictions, modification of transportation limits on hydrogen gas generation and volatile organic constituents within transportation containers, and identifying technologies to treat the waste."

Now on p. 5.
See comment 4.

8. Page 3, first full paragraph, fourth sentence – BNFL attempted to accelerate the permitting schedule to gain ample contingency in the construction and testing schedule. An unsuccessful attempt at acceleration does not cause a delay. There have been several factors that have affected the permitting schedule, including a change in the U.S. Environmental Protection Agency (EPA) guidance for preparation of risk assessments and response to public controversy over incineration.

Now on p. 5.
See comment 6.

9. Page 3, second full paragraph, seventh sentence and page 19, first full paragraph, second sentence – The evaluation of potential costs of delays was intended to reflect the upper bound of the Government's cost exposure. The use of the words "as much as" or "up to" would be preferable to "about".

Now on p. 11.
See comment 4.

10. Page 7, paragraph after first bullet, seventh and eighth sentences - The term "price adjustment" should be changed to "price redetermination." BNFL can request under FAR 52.216-5 a contract price redetermination after 25,000 cubic meters of waste has been processed.

Now on p. 12.
See comment 4.

11. Page 8, first full paragraph, fourth sentence - The report from the Blue Ribbon Panel on technological alternatives to incineration is due to the Secretary of Energy in December 2000.

Now on p. 13.
See comment 4.

12. Page 9, bulleted paragraph 1, last sentence - DOE suggests changing item (2) to: " is specified in the regulations for destroying the PCBs found within the specific waste forms at the INEEL."

Now on p. 14.
See comment 4.

13. Page 10, second full paragraph, fifth and sixth sentences – DOE suggests replacing both sentences with the following: "DOE is also evaluating regulatory options which would

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allow disposal of PCBs without treatment, and less restrictive requirements for transportation, and packaging options to reduce the amount of waste designated for incineration to about 3 percent. A DOE decision on the packaging options is expected in the near future."

Now on p. 14.
See comment 4.

14. Page 10, third full paragraph, third sentence - DOE suggests changing the wording to: "This alternative technology has been demonstrated on PCB-contaminated radioactive mixed waste, but not on transuranic waste."

Now on p. 15.
See comment 4.

15. Page 11, first full paragraph, first sentence - The alternative technology evaluation process and the investigation of regulatory options for PCB-contaminated waste are concurrent activities.

Now on p. 15.
See comment 4.

16. Page 11, first full paragraph, first sentence - A RCRA permit modification for WIPP from the State of New Mexico would also be needed.

Now on p. 15.
See comment 4.

17. Page 11, first full paragraph - Federal regulations also allow for the disposal of PCB-contaminated waste in an approved chemical landfill under specified conditions.

Now on p. 15.
See comment 7.

18. Page 11, second full paragraph, third sentence - DOE disagrees with the statement that "additional delays will likely occur" due to investigating alternatives. Evaluation of alternatives must include the ability of an alternative technology to be deployed in a timely manner such that delays do not occur.

Now on p. 16.
See comment 4.

19. Page 12, Table 2 - It would be DOE's preference that the far right hand column be footnoted as follows: "These dates have not been submitted to nor reviewed and approved by DOE and do not reflect any attempt at mitigating the affects of delayed construction start."

Now on p. 22.
See comment 4.

20. Page 18, second full paragraph, first and second sentences - Delete, "however, that DOE does not plan to agree to any contract modifications that would make commercial financing more feasible. He said." Currently there is no proposal from BNFL for a contract modification.

Now on p. 23.
See comment 4.

21. Page 19, second full paragraph, last sentence - One cannot say with certainty that the price increase "would have been less" only that it is likely.

Now on p. 23.
See comment 8.

22. Page 19, third full paragraph - There appears to be a misunderstanding of BNFL's attempt at accelerating the permit schedule. It is true that DOE approved BNFL's Project Management Plan that included an accelerated permit schedule; but approval of that PMP did not change the contractual milestone. DOE, EPA, and the State of Idaho worked to support BNFL's attempt at acceleration to the extent practicable, but knew it was very ambitious. DOE was very careful not to change the January 2000 milestone, but no one wanted to discourage BNFL from trying to complete early. The remainder of the paragraph

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cites the DOE Project Manager slightly out of context. The discussion was regarding the contract schedule, not BNFL's schedule for acceleration.

23. Page 20, first full paragraph - The possibility exists that, with technology changes and other alternatives for meeting disposal requirements, the contract price may decrease.

Now on p. 23.
See comment 4.

GAO's Comments

1. We address these comments in the Agency and Company Comments section of the report.
2. The draft report presented BNFL's view that it can slip the project's construction dates somewhat and still meet the December 2018 completion date. We also stated that it is unclear if flexibility in the operational phase of the project will be sufficient to absorb these delays. Therefore, we believe the report fairly presents this uncertainty.
3. We believe the term incineration adequately describes the thermal desorption treatment process because thermal desorption involves burning substances using an indirect heat source.
4. We agree. The final report was modified to reflect this comment as appropriate.
5. We modified the final report to clarify that price adjustments are provided for in the Federal Acquisition Regulation.
6. We disagree that the \$44 million reflects the upper bounding of the potential price increase. The \$44 million estimate is based on a 3-month delay in the start of construction. DOE's analysis also shows that a 24-month delay would add about \$71 million to the project. Therefore, we believe that the use of the term "about" is appropriate.
7. We modified the final report to clarify that additional delays will likely occur because of the need to modify the permit applications to remove the incinerator component.
8. We modified the final report to clarify that the discussion about the project's schedule dates in this paragraph related to the dates in the contract, not to those in BNFL's project management plan.